technical efficiency of organized medical facilities, the persistence of the curative emphasis the public's apathy towards prevention, the conditions of urban life, make the career of the personal physician less and less attractive. Unless an appreciation of his possibilities and an effective demand for his services can be created, rhetorical praise and tearful lamentations will be equally futile.

To be sure it is altogether possible that such a demand will not be made. Then old people must come to rely upon periodic examination systems, fortuitously discovered specialists, clinics and health centers, widely advertised panaceas, sage if conflicting advice of friends and all the other suggestions about health and disease in which modern society is so miscellaneously prolific. But even so the influence of a fortnight like this will do good. It will emphasize the special problems of old age, stimulate research, and let us hope advance by never so little the idea that health even for the aged can be made a positive goal; not merely an escape from disease.

THE PAINS, PENALTIES AND PROHIBITIONS OF OLD AGE—CAN THEY BE PREVENTED?[1]

SIR FARQUHAR BUZZARD

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The invitation to address you tonight is an honour of which I am deeply sensible and legitimately proud.

It may be that I owe it to the fact that William Osler's academic mantle has recently fallen on my shoulders and may suffice to cloak my deficiencies, or perhaps to that generous spirit which invariably impels you to accord a warm welcome to visiting members of our profession.

May I cherish, at any rate, the hope that my association with the Oxonian home of one who was esteemed and loved

[1] Delivered October 4, 1928.

equally by you and by us, and who did so much to foster our mutual understanding and goodwill, will secure for me an audience full of sympathy and devoid of the faculty of criticism.

In one sense that association was still unbroken when I sailed six weeks ago, but the news of Lady Osler's death a few days later means that I shall return to find a house in Norhams Gardens empty of its gracious and hospitable mistress, and Oxford mourning—the loss of a citizen honoured and beloved for herself as well as for the memories she recalled.

One such memory, perhaps, may be recalled while discussing the problems of old age; I refer to the intense personal interest evinced by Sir William, and maintained by Lady Osler to the last, in the ancient inhabitants of those charming Ewelme Almshouses, of which the Mastership has been invested for centuries in the Oxford Chair of Medicine.

May I add that their standard prescription for these pensioners was nicotine and not chloroform!

It was, I fear, in a moment of lightheartedness, engendered by the prospect of my first visit to your country, and in a spirit of alliteration more worthy of journalism than of science that I chose the title of "The Pains, Penalties and Prohibitions of Old Age" for my address. Subsequent deliberation has left me humiliated by my ignorance of the task I had set myself and more than surprised at the temerity which prompted its conception. Indeed I must preface my remarks by a prayer for your indulgence in the interpretation I shall put upon these words and for permission to add to them the interrogatory phrase: *Can they be prevented?*

Much attention is being devoted by other speakers to the purely physical aspects of aging and of old age, to the evitable and inevitable changes which sooner or later overtake the more menial tissues of the human body, the bones, the joints, the muscles, the cardio-vascular mechanism, the

viscera and ductless glands. All of these may, and often must, modify in some degree the effective control of man's activity, mental and physical, based as it is upon the integrity of his nervous system.

But like all other bodily structures the nervous system must surely have a life-span of its own, an inherent and individual potentiality responsive to and, in respect to endurance, dependent upon the treatment to which it is exposed. Why, otherwise, should nature allocate to that great healer, sleep, such a generous share of life's scanty hours? Does not such a beneficent provision for the restoration and conservation of our highest nervous forces suggest that we possess a store of energy the economic use and distribution of which are worthy of closer study than they often receive? Realizing the meagreness of material available for scrutiny and analysis, the pitfalls set by our ignorance of the laws of heredity, the complexity of causes and the elusive errors inevitable in estimating effects—realizing all these and recognizing the difficulties besetting an attempt to discriminate between the influence of extrinsic pathological factors, such as may be exerted through the circulation, and that of intrinsic, more physiological factors, such as activity and repose, in determining the expedition or delay of senescence, it requires some courage, perhaps some impudence, to seek an answer to *this* question: Can an individual so order his life as to prolong its prime to the maximum, leaving out of count such morbid hazards in its course as may spoil the score of years?

I am presuming that in discussing this problem of aging and old age, we are really considering the possibilities of prolonging the prime of life to its utmost limits and not of perpetuating indefinitely a vegetable existence. And by the prime of life we mean that phase of maturity during which the highest faculties of the nervous system can be exercised, during which the mind not only lives but is alive. If that be so we can hardly content ourselves with the gratuitous advice offered in daily papers by decrepit

individuals who have survived nine or ten decades and who attribute their longevity to abstinence from tobacco, a vegetarian diet, wholemeal bread, a daily apple or dose of castor oil, but never to medical advice! Can science provide more enlightenment?

In the pursuit of an answer to my question, it may be well to recall for a moment the process by which the nervous system reaches its functional maturity. From infancy, through childhood and adolescence, to adult life the nervous system grows and develops, not by multiplication of cells but by bringing more and more neural centres into action, by creating a wider range of response to external impulses and by opening up and utilizing an increasing number of association paths. To what extent vital activity can be reckoned in terms of reflexes, conditioned and unconditioned, is a question which will occupy the minds of philosophers for many years to come but need not detain us here, although in that sphere of physiology there may be the seeds of a method by which the sensitivity of the nervous system to new reactions will in the future be tested with scientific accuracy. And, perhaps, the period of aging and old age is coincident with the decline and fall of neural sensitivity.

The rapidity of the evolutionary process is notoriously variable in different individuals, in different races and perhaps in different sexes and the same adjective may be applied to the age of its completion; hence the terms precocity and slowness of development. There is some doubt in my mind, however, whether evolution is ever complete, whether there is any stationary phase intervening between evolution and devolution, or whether, in popular parlance, a man ever ceases to be young until he begins to grow old. If that be so, then the prime of life should be regarded as a dynamic, not a static, era.

We may assume that, generally speaking, association paths once opened up and used are available for indefinite periods and, on the other hand, that there comes a time when paths, hitherto untrodden, no longer preserve their

potential right of way. Experience teaches us that the earlier a path is explored in life the smoother it remains, even if neglected for a while. Or, from the more physiological point of view, we shall agree that our responses are quicker and more accurate the earlier they are acquired, and that later on in life certain stimuli, if applied for the first time, elicit incomplete or no replies.

If, then, a man's neural sensitivity is the index of his age, its decline is expressed by his difficulty in retaining fresh impressions, his reluctance to forming new associations and his inadequacy in responding to unaccustomed impulses.

Our attention may now be turned to a consideration of the influence exerted by a number of more or less normal or natural agencies on the preservation of neural sensitivity, and in this pursuit we must not forget a law of wide but not universal application. I refer to the fact that its most recently acquired and its most highly specialized functions are the first to fail when, on the one hand, the nervous system is exposed to certain noxious agencies such as fatigue or various organic and inorganic poisons, or when, on the other, it suffers from a deficiency of certain ingredients normally provided by the glands, the food or the atmosphere. The child is naughty when tired, the youth irresponsible under the influence of alcohol, the steadiest of adults loses all judgment on reaching altitudes of oxygen want, and if, prevailing beliefs are of any account, we should all be giants of prowess if only we could absorb a sufficient quantity and variety of vitamines.

In discussing the influence of some of these agencies I must, perforce, rely chiefly on personal experience and observation, and any deductions I may make have but little claim to scientific support.

The nervous system is guarded against the harmful results of overactivity by the supervention of fatigue, with the result that repeated excess is rarely possible under normal conditions. We know that changes occur in nerve

cells as a consequence of physical action and it is to be presumed that similar alterations are associated with mental exertion. We know that physical rest is capable of effecting restoration in the one case and there is no reason to doubt that sleep has equivalent powers in the other.

When, however, we approach the problem of the permanent effects of excessive and repeated activity, with intervening periods of sleep, on the longevity of nervous mechanisms we must admit our ignorance. It is a popular and to some extent a professional belief that overwork is a factor of importance in the etiology of many morbid processes, in other words, that work may exert the properties of a cumulative poison. Staleness is something which we recognize as a condition from which recovery is easily made, and, in my opinion the view that there are permanent results of overwork commonly responsible for the onset of old age is one which we must accept with great caution, if at all. It is certainly not one's impression that it is the most active or even the most troubled minds that are the first to fail, The desire, however, that the process of aging, and even that death itself, may have creditable references and honorable mention is so human that the belief in this hypothesis of cause and effect is likely to long survive its exposition as a fallacy, if such it be, and to delay for many years the popular acceptance of the lesions of pathological anatomy.

In this connection it is not without profit to recall experiences familiar to all of us—the refreshing, the rejuvenating effects of a change in activity. A sense of intolerable fatigue engendered by intense activity in a limited field may be dissipated in a moment by altering the scene of interest. Translated into terms of neuro-physiology it may be asserted with some confidence that while it is comparatively easy to exhaust the supply of energy in a defined area, it is difficult to deplete the whole cerebral field of its natural resources.

Is it possible that herein lies a cue to one of the principles governing the prevention of the pains, penalties and

prohibitions of old age? I suggest that a multiplication of interests early in life, the opening up of numerous association paths in the nervous system is a measure to be encouraged and one which may well be calculated to check the advances of senility. Is it not true that among those whom we have known as young for their years the large majority have displayed a wide range of interests and sympathies. If the pains, penalties and prohibitions of old age are really preventible, then its pathos may be illustrated by the picture of a man of sixty who throws away his morning paper after reading the Wall Street news or by that of a woman of similar age whose mental appetite is appeased for the day when she has interviewed her cook!

And here I would say a word on the subject of physical exercise in relation to the inquiry upon which we are engaged. Fashions are notoriously fickle but every few years there arises a vogue for physical culture founded partly on aesthetic grounds, but largely on the fallacy that our good health has some relation to the size of our muscles and that violent muscular exertion is a valuable antidote to the poisonous properties of mental effort. I do not hesitate to say that I have seen a number of cases of exhaustion neurosis resulting from this popular conception of hygiene and there is little doubt that confusion reigns in the lay mind in regard to the relative merits of physical culture, the object of which is to develop muscles, and of games of skill, the *chief* advantages of which lie in the fact that they supply *mental* recreation. From the gerontologists point of view, therefore, athletic games are to be encouraged in that they add to the list of *cerebral* activities, to the sum of varied interests. Even when advancing years prohibit personal participation, the role of an understanding spectator is not to be despised.

Change, as a restorative, is no new suggestion, as a preserver of faculties it may be an important factor in deferring infirmity. But the elaboration and criticisms of its possibilities I must leave to your imagination if I am to

avoid the detailed consideration of the arts, muses and 'ologies and the more dangerous topic of polygamy.

In the interests of the human mind the ideal life may, perhaps, be described as a variety entertainment with a first rate comedy as its piéce de resistance.

From work and play to food is but a short and natural step and on this subject the comments I propose to make will be brief and to the point.

To the child, the youth and the young adult food is a legitimate and not always neglected source of enjoyment. After forty years of age, it should be regarded as a disagreeable necessity of life and as the chief menace to the preservation of mental and physical activity. A superfluity of food has all the attributes of a subtle poison and indulgence in it all the dangers of an insidious vice. I have no advice, no convictions to offer to the healthy individual on the subject of food except that he should err on the side of moderation, become a slave to no particular diet and pay little attention to the regularity of his meals. An occasional day of starvation is a hygienic measure of much value.

Many, if not most wives, contrive to shorten their husbands' lives, not always an unpardonable crime, by tempting and encouraging them to overeat in middle age. "Feed the brute" is as often a policy of extermination as of pacification! How many of the pains and penalties of old age would be averted if this dietetic principle were observed it is impossible to estimate but their name is surely legion.

No general laws can be laid down. Each individual is a law unto himself and if a man or woman of forty has not learned what kind and what minimum quantity of food suffices to maintain his or her health, the time has come to appeal for medical assistance and advice.

The crime of lèse-majesté is, I presume, unrecognized under a Republican Government and I may be permitted to make a short contribution to the liquor controversy in

so far as it is germane to the subject I am considering. The excessive use or abuse of alcohol will, without any doubt, shorten the effective life-span of the nervous system and particularly that of its highest faculties. On the other hand the physiological effects of alcohol in moderate and occasional doses are more difficult to appraise. The fleeting stimulation, followed by the longer but still transient blunting of the finest intellectual and inhibitory processes is a phenomenon similar to, but more rapid than, that which results from normal mental activity followed by fatigue.

It has undoubtedly agreeable and possibly recreative properties and if it exerts any harmful influence on the duration of cerebral efficiency, these are probably proportionate to the frequency of its occurrence.

At the beginning of this address I formulated a question: "Can an individual so order his life as to prolong its prime to the maximum limit?" I hoped to make it clear that the prime of life was intended to represent the acme of mental activity and that no attention would be paid to the modifying influence of the various diseases and accidents with which the path of life may be strewn. My inquiry was for principles which might guide the individual to his goal and has been limited in scope. Only such simple questions as those of work, mental and physical, play, fatigue, rest, sleep, food and drink have passed lightly under review and I ask myself at its conclusion for the principles which have come to light.

One was obvious from the outset—the avoidance of excess, not so much in work as in food and drink.

If there is another it is certainly the promotion of change, change in occupation, habit and diet. In fact the individual seeking to prolong his prime must not *order* his life too much. A judicious amount of disorder and of irregularity should be encouraged. I am conscious that this opinion in regard to the variety of activity and irregularity of habit, as powerful aids to preserving the elasti-

city of the human mind—and after all we desire to preserve our mental elasticity as much as the elastic component of our arterial walls—is not altogether orthodox.

I am aware that there are some who regard with anxiety the rapidity of life made possible by modern methods of transport and communication; and who declare that there is an increased sum of nervous disorders as the result of these changes.

But there is another and happier aspect. The judicious use of modern inventions—and judgment will follow as novelty wears off—will favour the diversification of mental and physical activities and facilitate a wider distribution in the expenditure of nervous energy, an end which, to my way of thinking, is very desirable.

Nervous disorders are most common among those members of the community whose interests are few and whose fields of action are limited. Regular work, regular play and regular meals and regular hours of sleep may be the slogan of the health expert and may indeed be the guide to a prolongation of life. But we don't want to prolong life; we want to put off that evil hour when our mental horizon begins to narrow, our views become more rigid, our tolerance, sympathies, insight and interest less wide. Rather death than life spent under the tyranny of years!

OLD AGE AND WHAT IT MEANS TO THE COMMUNITY [1]

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Interest in the problem of old age is perennial, because we forever grasp at the hope that we may, somehow, stave off those nightmares of life, senility and death. It is, therefore, of the very first importance that physicians in any

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